



The volume of one mole of any gas at room temperature and pressure is  $24 \text{ dm}^3$

- 1 What is the volume of 0.50 moles of hydrogen gas ( $\text{H}_2$ ) at room temperature and pressure?

$$\text{volume of H}_2 = 24 \times \text{moles} = 24 \times 0.50 = 12 \text{ dm}^3$$

- 2 How many moles in  $1.8 \text{ dm}^3$  of helium gas ( $\text{He}$ ) at room temperature and pressure?

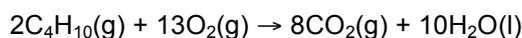
$$\text{moles of He} = \frac{\text{volume}}{24} = \frac{1.8}{24} = 0.075 \text{ mol}$$

- 3 What is the volume of 7.0 g of nitrogen gas ( $\text{N}_2$ ) at room temperature and pressure?

$$\text{moles of N}_2 = \frac{\text{mass}}{M_r} = \frac{7.0}{28} = 0.25 \text{ mol}$$

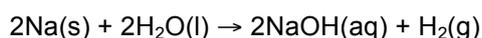
$$\text{volume of N}_2 = 24 \times \text{moles} = 24 \times 0.25 = 6 \text{ dm}^3$$

- 4 What volume of oxygen gas reacts with  $100 \text{ cm}^3$  of butane gas, with both gases measured at the same temperature and pressure?



$$\text{volume of O}_2 = \frac{13}{2} \times \text{moles C}_4\text{H}_{10} = \frac{13}{2} \times 100 = 650 \text{ cm}^3$$

- 5 What volume of hydrogen gas, measured at room temperature and pressure, is formed when 6.9 g of sodium reacts with water?



$$\text{moles of Na} = \frac{\text{mass}}{M_r} = \frac{6.9}{23} = 0.30 \text{ mol}$$

$$\text{moles of H}_2 = \frac{1}{2} \times 0.30 = 0.15 \text{ mol}$$

$$\text{volume of H}_2 = 24 \times \text{moles} = 24 \times 0.15 = 3.6 \text{ dm}^3$$